

is interpreted as a design competition leading firms to make their products more specific or more general with respect to consumers' preferences, in this paper the transportation cost competition is assimilated to a technological competition. Changes in transportation costs are seen as technological changes associated to the customization process. Therefore, the pricing strategies for customized products result from competition in the technology of customization and from competition in final prices. The main result of the paper is that this technological competition intensifies price competition (consistently with the findings in the literature on innovation), leading to a market configuration characterized by high concentration and low prices for each variety of the customized good. In a sense the model may be seen as an attempt to justify the observed phenomenon of mass-customization: a few basic varieties of products are offered, but in many versions and at low prices.

The paper is organized as follows. In section 2 the spatial framework adopted in the model is briefly described. Section 3 analyses a three stage-game in which, after profitable entry, firms engage a technological competition on customization costs and prices. This game is studied under two alternative hypotheses on the choice of customization costs: in section 3.1 this is assumed to be costless, i.e. firms may choose different customization technologies without altering the production cost of the basic variety; in section 3.2 this simplified assumption is relaxed, by positing that more efficiency in customization requires higher set-up costs. In the same section a brief discussion of the mass-customization phenomenon is also offered. Finally, some concluding remarks and comments are gathered in section 4.

2 The spatial framework

Competitive product differentiation under discriminatory pricing allows to study product customization. As mentioned above, the standard spatial model of price discrimination drawn from Thisse and Vives (1988) is used on this purpose. In order to investigate the long run equilibrium generating by a free-entry process, this framework is combined with the Salop model (1979).

More specifically, I consider the market for a horizontally differentiated product, whose characteristics may be represented as points of a circle. Consumers are heterogeneous in preferences and uniformly distributed on this circle whose length is normalized to 1. Firms are located symmetrically on this characteristics space. In what follows a unit demand is assumed at all

points of the circle. The product at firm i 's locations represent the basic product of firm i , its basic variety, but the latter can be redesigned by the firm in order to match the specific consumers' requirements bearing a unit constant customization cost t_i , so that the total customization cost is assumed to be linear in distance. In what follows, we shall call *variety* the basic product offered by the firm, and *version* the tailored product offered at each location. The parameter t_i synthesizes the technological properties of the customization activity or equivalently, according to Norman (2003) and Thisse and Vives (1988), the variable cost of redesigning the base product. The higher the technological parameter t_i , the higher are the customization costs incurred by the firm in the market.

We shall assume that each firm has access to a set of different customization technologies. This set is the same for all firms, which also share the same information technology. The customization technology adopted by a firm is always observable by its competitor. The competing firms are assumed to be able to offer individually tailored goods such that all the varieties of a basic product are offered; moreover they are assumed to be able to discriminate perfectly among consumers, by setting a price schedule $p(x)$ for each variety depending on consumers' location x , where x is the distance of a consumer from the generic firm i . This price charged to the consumers includes the cost associated with product customization, so that the mill price at each location is the price corrected for the customization cost - the transportation cost of adapting the firm's base product to consumers' needs.

In order to focus on the role of transportation costs, we assume that the basic variety is produced at zero variable costs. However, firms bear a set-up cost F to enter the market. This cost may be either constant and independent of the customization cost, or decreasing in the latter. In the first case the choice of a more efficient customization technology is costless for the firm; in the second efficiency in customization imposes higher set-up costs.

3 Pricing customization

It is within the above framework that the following three-stage game is analysed: firms are assumed to decide first their entry into the market, and then to engage a customization cost competition and a price competition. At each stage of the game firms' choices are simultaneous. The game is solved by backward induction. We solve first the price stage of the game, then we deal with the optimal choice of the customization cost. The optimal